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original



July 2, 1998

Mr. Lester Snow  
CalFed Bay Delta Program  
1416 Ninth Street, Suite 1155  
Sacramento, CA 95814

Dear Lester:

The Planning and Conservation League Foundation is pleased to submit the attached proposal to study the feasibility of reintroducing spring-run chinook salmon and steelhead trout to the North Fork of the Yuba River. The Upper Yuba currently is blocked to fish passage by Englebright Dam and Bullard's Bar dam, which are the two largest stressors to anadromous fish on the Yuba.

The Planning and Conservation League Foundation is planning a fish passage assessment of the Yuba's North Fork. We will be working directly with Professor Peter Moyle, of UC Davis and Harza Engineering to carry out an analysis of the biological, engineering, political and funding feasibility of Upper Yuba salmonid reintroduction. The South Yuba River Citizen's League will be carrying out a companion study which will investigate the Middle and South Forks of the Yuba and possible elimination of Englebright Dam.

SYRCL and the Planning and Conservation League Foundation believe these two studies are highly complementary and that together they represent the most comprehensive fish restoration feasibility assessment now being proposed for a California watershed. As these two studies proceed over the coming several years, the Planning and Conservation League Foundation and SYRCL have agreed to share information about the biological, engineering and stakeholder investigations we will carry out and we will cooperate to the greatest extent possible as this work proceeds.

We look forward to working with SYRCL and with CalFed to carry out this important project!

Sincerely,

Gerald H. Meral  
Executive Director

Chairman  
David L. Hirsch

Trustees  
Frank Breen  
Harriet Burgess  
Russell Fournier  
Robert Kirkwood  
Ellen Maldonado  
William Wilcox

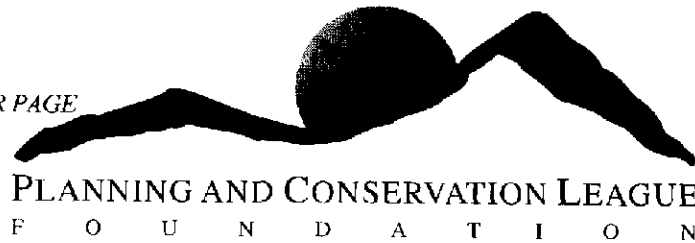
Executive Director  
Gerald H. Meral, PhD

926 J Street, Suite 612 Sacramento, CA 95814 916.444.8726 FAX 916.448.1789  
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I-008172

I. COVER PAGE



Title: ***RESTORING STEELHEAD AND SPRING RUN SALMON TO THE NORTH  
FORK OF THE YUBA RIVER WATERSHED: A NORTH FORK FISH PASSAGE  
FEASIBILITY STUDY***

Topic: Fish Passage Assessment

Summary

Information: The purpose of this study is to carry out a reconnaissance-level to study the feasibility of various methods which spring-run chinook salmon and steelhead trout could use to bypass stressors that now prevent them from reaching their historic spawning grounds in the North Fork of the Yuba River.

Certification: Attached to this cover page

Chairman  
David I. Hirsch

Trustees  
Frank Butler  
Harriet Burgess  
Russell Faure-Bla.  
Robert Kirkwood  
Ellen Madsen  
William Wicksen

Executive Director  
Gerald H. Meral, PhD.

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I-008173

## COVER SHEET (PAGE 1 of 2)

## May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Proposal Title: Restoring Steelhead and Spring-Run Salmon to the North Yuba River Watershed: A Fish Passage Feasibility Study  
 Applicant Name: Planning and Conservation League Foundation  
 Mailing Address: 926 J Street, Suite 612 Sacramento, CA 95814  
 Telephone: (916) 444-8726, Ext. 7  
 Fax: (916) 448-1789

Amount of funding requested: \$ 79,972 for 1 years

Indicate the Topic for which you are applying (check only one box). Note that this is an important decision: see page    of the Proposal Solicitation Package for more information:

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Fish Passage Assessment                               | <input type="checkbox"/> Fish Passage Improvements    |
| <input type="checkbox"/> Floodplain and Habitat Restoration                               | <input type="checkbox"/> Gravel Restoration           |
| <input type="checkbox"/> Fish Harvest   | <input type="checkbox"/> Species Life History Studies |
| <input type="checkbox"/> Watershed Planning/Implementation                                | <input type="checkbox"/> Education                    |
| <input type="checkbox"/> Fish Screen Evaluations - Alternatives and Biological Priorities |   |

Indicate the geographic area of your proposal (check only one box):

- |   |   |
|---|---|
| <input type="checkbox"/> Sacramento River Mainstem              | <input checked="" type="checkbox"/> Sacramento Tributary: <u>North Fork, Yuba River</u> |
| <input type="checkbox"/> Delta                                  | <input type="checkbox"/> East Side Delta Tributary: <u>                    </u>         |
| <input type="checkbox"/> Suisun Marsh and Bay                   | <input type="checkbox"/> San Joaquin Tributary: <u>                    </u>             |
| <input type="checkbox"/> San Joaquin River Mainstem             | <input type="checkbox"/> Other: <u>                    </u>                             |
| <input type="checkbox"/> Landscape (entire Bay-Delta watershed) | <input type="checkbox"/> North Bay: <u>                    </u>                         |

Indicate the primary species which the proposal addresses (check no more than two boxes):

- |  |   |
|--|---|
| <input type="checkbox"/> San Joaquin and East-side Delta tributaries fall-run chinook salmon | <input checked="" type="checkbox"/> Spring-run chinook salmon |
| <input type="checkbox"/> Winter-run chinook salmon   | <input type="checkbox"/> Fall-run chinook salmon              |
| <input type="checkbox"/> Late-fall run chinook salmon  | <input type="checkbox"/> Longfin smelt                        |
| <input type="checkbox"/> Delta smelt   | <input checked="" type="checkbox"/> Steelhead trout           |
| <input type="checkbox"/> Splittail   | <input type="checkbox"/> Striped bass                         |
| <input type="checkbox"/> Green sturgeon  |   |
| <input type="checkbox"/> Migratory birds   |   |

COVER SHEET (PAGE 2 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Indicate the type of applicant (check only one box):

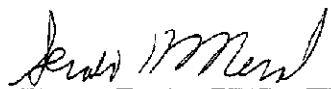
- |  |  |
|--|--|
| <input type="checkbox"/> State agency                    | <input type="checkbox"/> Federal agency        |
| <input type="checkbox"/> Public/Non-profit joint venture | <input checked="" type="checkbox"/> Non-profit |
| <input type="checkbox"/> Local government/district       | <input type="checkbox"/> Private party         |
| <input type="checkbox"/> University                      | <input type="checkbox"/> Other: _____          |

Indicate the type of project (check only one box):

- |  |   |
|--|---|
| <input type="checkbox"/> Planning            | <input type="checkbox"/> Implementation |
| <input type="checkbox"/> Monitoring          | <input type="checkbox"/> Education      |
| <input checked="" type="checkbox"/> Research |   |

By signing below, the applicant declares the following:

- (1) the truthfulness of all representations in their proposal;
- (2) the individual signing the form is entitled to submit the application on behalf of the applicant (if applicant is an entity or organization); and
- (3) the person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section II.K) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.



(Signature of Applicant)

II. EXECUTIVE SUMMARY - **RESTORING STEELHEAD AND SPRING RUN SALMON  
TO THE NORTH FORK OF THE YUBA RIVER  
WATERSHED: A NORTH FORK FISH PASSAGE  
FEASIBILITY STUDY**

The Yuba River watershed was, historically, one of the most productive habitats for runs of chinook salmon (*Oncorhynchus tshawytscha*) and steelhead rainbow trout (*O. mykiss*). Prior to the devastation of the watershed by 19th century hydraulic mining and the subsequent construction of major dams, three runs of chinook salmon (spring, fall, and late fall) were abundant in the Yuba River, as were steelhead (Yoshiyama et al., 1996). Of the nine major Central Valley rivers that feed the San Francisco Bay-Delta, the Upper Yuba offers one of the best opportunities for restoration of salmon and steelhead spawning grounds.

Unfortunately, no studies have yet been done to measure the feasibility of restoring salmon and steelhead to the Upper Yuba or recommend possible engineering, political and economic actions that could be taken to make such a restoration project a reality. CalFed, DFG, Legislative and Federal policies all support the restoration of spring run chinook salmon and steelhead to above-dam reaches of Central Valley rivers. CalFed's ERPP specifically supports studies to assess the feasibility of various fish passage techniques to move fish around stressors, such as dams.

The Planning and Conservation League Foundation proposes to carry out a reconnaissance-level fish passage study for the North Fork of the Yuba River. The study will be carried out in three parts with three partners from academia, the private sector and the non-profit sector. These partners are Peter Moyle, noted fish biologist on the faculty of UC Davis; Harza Engineering Company, which has extensive experience designing and evaluating mechanisms to allow fish to pass around dams; and the Planning and Conservation League Foundation, which has long played a role in creating solutions to environmental problems. The study would be conducted between June, 1999 and January, 2000.

The PCL Foundation will also work closely with the South Yuba River Citizen's League (SYRCL), as it carries out a related study of the feasibility of removing or reconfiguring Englebright Dam, originally built for sediment and debris control. Removal of this Dam would make anadromous fish restoration much easier. SYRCL is submitting a separate proposal to CalFed to fund a study of this idea. The PCL Foundation and SYRCL will work closely together to coordinate the two studies, share the engineering and biology findings and coordinate important information about contacts with stakeholders as the studies proceed.

The budget for this project is \$159,943. We are requesting one-half of this amount, or \$79,972, from CalFed. This amount will leverage the remaining half, which we are requesting from the National Fish and Wildlife Foundation and will soon be requesting from Prop 204 allocations, and from the Four Pumps allocation.

If CalFed funds are applied to this project, and to the SYRCL's Englebright Dam project, which is a companion proposal to this one, the resulting feasibility study will directly answer the question of whether and how steelhead and salmon can be reintroduced to their historic habitats on the South, Middle and North Forks of the Yuba River. Together these two studies represent the most

comprehensive investigation of the Yuba yet proposed. Upcoming changes in dam operations, which might result from forthcoming hydropower relicensing decisions, have the real potential to make salmon and steelhead restoration on the Upper Yuba a genuine possibility for the first time, provided adequate feasibility studies are first conducted.

In the long run, the study will reveal cost-effective biological and engineering methods that can be applied to the restoration of salmon and steelhead to the Upper Yuba River and which could lead to the reintroduction of a fully self-sustaining fish population. If the fish passage techniques which this study will identify and examine can be applied in the challenging Upper Yuba River context, they have the potential for much broader use elsewhere in California, benefiting salmon and steelhead in other watersheds and, perhaps, other species of fish affected by entrainment.

If the results of this reconnaissance-level feasibility study suggest that fish passage on the North Fork of the Yuba is potentially feasible, we will proceed to a more detailed level of analysis, which will provide detailed data about fish passage options, costs, and political considerations. With that information, planning for an actual chinook salmon and spring-run steelhead restoration project could then begin.



## PLANNING AND CONSERVATION LEAGUE

F O U N D A T I O N

**Title:** *RESTORING STEELHEAD AND SPRING RUN SALMON TO THE YUBA RIVER WATERSHED: A NORTH FORK FISH PASSAGE FEASIBILITY STUDY*

**Name of applicant:** Planning and Conservation League Foundation

**Principal Investigators:** Gerald Meral, Executive Director, Planning and Conservation League Foundation  
Peter Moyle, Ph.D., Professor of Fisheries Biology, Department of Wildlife, Fish and Conservation Biology, UC Davis  
John Pizzimenti, Principal, Harza Engineering

**Participants/collaborators in Implementation:**

South Yuba River Citizen's League, Nevada City, CA  
Sean Garvey, Executive Director

The Yuba River Watershed MOU Group, consisting of:

Nevada County Resource Conservation District  
US Forest Service  
Bureau of Land Management  
California Department of Forestry and Fire Protection  
California Department of Parks and Recreation  
Natural Resources Conservation Service  
Northern Sierra Air Quality Management District  
City of Nevada City  
Yuba Watershed Institute  
Friends of Deer Creek  
49er FireSafe Group  
Nevada County Superintendent of Schools  
High Sierra Resource Conservation & Development

**Address:** Planning and Conservation League Foundation  
926 J Street, Suite 612, Sacramento, CA 95814  
**Phone:** (916) 444-8726, Ext. 7  
**Fax:** (916) 448-1789  
**Email:** mdelavergne@pcl.org  
**Type of organization:** 501 (c)(3), nonprofit  
**Tax ID Number:** 94-2190378

*Chairman*  
David L. Hirsch

*Trustees*  
Frank Rosen  
Harriet Burgess  
Russell Faure-Brac  
Robert Kirkwood  
Ellen Maldonado  
William Wilcoxon

*Executive Director*  
Gerald H. Meral, PhD.

#### IV. PROJECT DESCRIPTION

##### a. Project Description and Approach

This study is a reconnaissance-level study of Yuba River's North Fork to determine the following:

- 1) if habitat still exists which would be useful to salmon and steelhead
- 2) the possibility of passing the fish upstream and downstream around the dams
- 3) the level of stakeholder support for bringing salmon and steelhead back to the upper watershed
- 4) potential funding sources to implement such re-introduction.

The study proposes to investigate a variety of methods for moving adult salmon and steelhead around Englebright and Bullard's Bar dams, and restore access to their extensive former habitat upstream in the North Fork, including ladders, pipelines, trapping, trucking and other means. The alternative method of improving steelhead habitat, releasing large amounts of cold water downstream of the Englebright Dam, seems unlikely to be achieved due to operational constraints. The study will also consider the problems involved in moving the young fish back downstream.

• *Biological Assessment* This phase would consist of a field review of the North Fork of the Yuba River and its major tributaries during the summer of 1999. A biologist would travel these streams assessing the amount and quality of spawning habitat remaining. Among the multiple stressors to be evaluated will be the following:

1. surface area of spawning beds, number and size of holding pools
2. extent and quality of riparian habitat
3. likely impacts of existing human activity (mining, fishing, rafting, etc) on each run of fish
4. existing flow regimes (with respect to quantity, quality, and temperature) caused by natural runoff and artificial releases.

The biologist would survey the North Fork from Englebright Dam to Bullard's Bar Dam, and from Bullard's Bar Dam upstream to the first complete barrier to fish passage, which is not far downstream of Yuba Pass. Major tributaries like Slate, Canyon, Goodyear, Lavezola, Haypress, Salmon, Howard, Deer, Haskell, and Lincoln Creeks and the Downie River will also be surveyed to the limits of fish passage. Consideration will be given to the practicality of restoring different runs of salmon and steelhead to each stream segment. An evaluation of all natural and artificial barriers to migration would be made. The South Yuba River Citizen's League will study the Middle and South Forks. The Planning and Conservation League Foundation and SYRCL have agreed to work together on these two projects, sharing biological, engineering and stakeholder data as the studies proceed ( A support letter from SYRCL is attached, as Exhibit A)

Where needed, the possibility of improving this habitat through artificial means such as mechanically improving the stream beds, importing gravel immediately downstream of stream-blocking dams, and preserving and restoring riparian habitat will be evaluated. An assessment will be made of rearing habitat for juveniles of both steelhead and salmon; as well as holding habitat for adult spring run chinook salmon and possibly summer steelhead. Locations for trapping downstream migrants will be reviewed. At the moment, trapping upstream of Bullard's Bar seems most practical. Some consideration will also be given to increased angling opportunities if the program is successful, both



upstream and downstream of Bullard's Bar Reservoir. A summary review will be given to expected changes in releases due to planned housing and other developments.

- *Engineering Assessment* Harza Northwest, an engineering consulting company experienced with fish passage and trapping facilities, will review the engineering problems and likely costs of the proposal. This work will be done in coordination with the biological part of the study.

The first and most important part of the engineering assessment would be an evaluation of the feasibility of moving upstream migrants by truck, ladder or elevator around Englebright and Bullard's Bar Dams to North Fork spawning areas. The physical sites would be inspected, and comparable facilities at other dams would be reviewed based on published data. The efficacy of such facilities as they might be installed at the Yuba River would be considered. A very rough estimate of the cost to implement the most effective facilities would be prepared.

The final part of the engineering assessment would be the engineering aspects of building traps for downstream migrants on the North Fork below the Highway 49 bridge. A rough estimate of the costs of building and operating such structures would be prepared, including the costs of any necessary facilities to transport and return fish to the river downstream of Englebright Dam. In addition, some consideration will be given to permanent facilities (such as channels and pipelines) to allow the fish to migrate without needing to be trucked. We recognize that some of these options, such as trucking and ladders, have proven problematic in other areas such as the Columbia River. But on the Yuba's North Fork, the dams are much smaller, the river itself is much smaller, nitrogen levels may be lower, and the reservoirs are small enough to permit much more successful fish passage.

Natural processes and functions as a means of restoration will be among the various restoration options considered in this study, including allowing young fish to pass through the two reservoirs on their own. Flow conditions above Bullard's Bar are already fully adequate for fish restoration purposes, and below Englebright, hydrological modeling would need to be done subsequent to this initial study, should this investigation show that further study is warranted.

- *Coordination and Funding Feasibility* This part of the study will consider two elements: the local support for implementing the recommendations this study will generate, and possible funding sources for the implementation of the program. To determine the reaction of state and local leaders to the concept, interviews will be conducted with opinion and political leaders in Yuba and Sierra Counties, including elected officials, chambers of commerce, environmental groups, newspapers, and others who could influence the implementation of actual restoration. Special attention will be paid to local water officials in the counties. The PCL Foundation and the South Yuba River Citizen's League will work together to further develop relationships with these groups and individuals, building on groundwork SYRCL has already begun with key stakeholders.

Discussions will also be held with state and federal officials, such as the Department of Fish and Game, Fish and Game Commission, Fish and Wildlife Service, National Marine Fisheries Service, Department of Water Resources, Bureau of Reclamation, and others. Discussions will be held with Pacific Gas and Electric since their power operations impact flows on the Yuba downstream of Bullard's Bar and Englebright Dams. Discussions will take place with the economic interests that presently use the river and could be affected by salmon and steelhead reintroduction. These include

property owners along the river, gold mining, rafting and kayaking and their impacts on over-summering adults in the North Fork of the Yuba River.

Finally, this part of the study will consider the feasibility of a wide variety of funding sources which could be actually be used to implement salmon and steelhead restoration. These include the following:

1. Funds to improve fisheries pursuant to the agreement to install four additional pumps at the Harvey Banks Delta Pumping Plant
2. Central Valley Project Improvement Act Funds dedicated to doubling the salmon in the Central Valley
3. USBR Delta pumping plant mitigation funds; mitigation funds from hydroelectric powerplant relicensing;
4. Funds from Proposition 204 and other funding sources which may become apparent during the course of the study.

**b. Proposed Scope of Work**

	<b><u>Cost</u></b>	<b><u>Schedule</u></b>	<b><u>Deliverable</u></b>
<b>Biology:</b>			
Task 1 Initiate North Fork survey.	\$7,148	June-July, 1999	
Task 2 Complete North Fork Survey.	10,397	August	
Task 3 Complete surveys or re-surveys.	6,498	September	
Task 4 Evaluate trapping & transportation program	14,296	September	
Task 5 Consider other biological elements.	13,646	October	
Task 6 Prepare draft biology report & distribute to reviewers	6,498	October	Draft Report
Task 7 Consider reviewer comments & prepare final report.	6,498	Nov - Jan	Final Report
<b>Engineering:</b>			
Task 1 Inspect facilities.	\$8,240	July	
Task 2 Review alternatives to bypass Bullard's Bar and Englebright Dams.	11,985	July	
Task 3 Continue dam bypass work.	7,491	August	
Task 4 Review fish trapping and transportation alternatives.	16,480	September	
Task 5 Complete and distribute review draft of engineering report.	15,730	October	Draft Report
Task 6 Consider comments of reviewers and prepare final report.	14,982	November	Final Report
<b>Coordination:</b>			
Task 1 Meetings with interest groups.	\$2,206	July	
Task 2 Prepare draft of funding alternatives report.	3,209	August	Draft Report
Task 3 Prepare list of issues of importance to state and local leaders	2,006	August	Issues List
Task 4 Begin review of ways to respond to these issues	4,412	August	
Task 5 First draft of responses to state and local concerns.	4,212	September	Draft Response
Task 6 Review draft of funding alternatives.	2,006	September	
Task 7 Distribute review draft of engineering report.		October	
Task 8 Consider comments of reviewers and prepare final report.	2,006	Nov-Jan	Final Report

**c. Location and/or Geographic Boundaries of the Project**

This project is located in Yuba, Sierra and Nevada Counties, as described fully in "Project Description," biological and engineering assessments sections. The majority of the North Yuba is in Sierra County. (Please see the attached map, which is Exhibit B).

d. Expected Benefits

**Comprehensive Restoration** When fully implemented, this project will address priority habitats and species as identified by CALFED. Historic habitat is substantial, and opportunities for restoration present CALFED with an historic opportunity to implement a restoration program on an entire river system with comparatively few negative consequences. Together with SYRCL's Englebright Dam proposal, this proposal would be the most significant and comprehensive restoration proposal in the Sierra Nevada.

**Priority Habitat** In the long run, reintroducing steelhead and spring-run chinook above Englebright and Bullard's Bar Dams would represent a tremendous benefit for the remaining populations of these fish by reducing stressors and enabling them to regain access to the traditional spawning and rearing habitat from which they are now blocked. The Yuba River system represents a priority habitat as identified by CALFED, an instream aquatic habitat that provides spawning and rearing habitat for the anadromous species in the Bay-Delta ecosystem.

**New Data** Because the study will look at both salmon and steelhead restoration, its results can provide hard data that have the potential to justify a restoration program, based on a variety of land (by-pass technologies) management and water management (flow-based approaches) which will benefit both species. In the long run, the study will reveal cost-effective biological and engineering methods that can be applied to the restoration of salmon and steelhead to the Upper Yuba River and which could lead to the reintroduction of a fully self-sustaining salmon and steelhead population.

**Assistance to a Priority Species** Steelhead and chinook salmon are CalFed priority species. Among other things, fish passage around Englebright Dam and Bullard's Bar to the North Fork would promote increased use of salmonid habitat, leading to greater genetic diversity in the stocks using the habitat, thereby directly advancing CalFed's goal of restoring fish populations to self-sustaining levels.

**Replication of Techniques and Results** If the fish passage techniques which this study will identify and examine can be applied in the challenging Upper Yuba River context, they have the potential for much broader use elsewhere in California, benefiting salmon and steelhead in other watersheds and, perhaps, other species of fish affected by entrainment.

**Useful Information for the Public** Since this type feasibility study has not been carried out for the Yuba River, as a new source of information, this study will have a direct and immediate educational value to the many stakeholders involved in this issue. Should salmon and steelhead be introduced to the Upper Yuba, the story of the restoration itself will have tremendous educational value for hundreds of thousands of people who annually visit the Upper Yuba River.

**Economic Benefits** Once implemented, the project will confer significant economic benefits to upstream communities by the reintroduction of wild salmon and steelhead to the Yuba River Watershed economic benefits in the tens of millions of dollars could be anticipated through increased recreation, fishing and tourism.

e. Background and Ecological/Biological/Technical Justification

This is a new project, which is a variation on a similar project first proposed to CalFed in 1995 to examine anadromous fish restoration on the Upper American River. For purposes of this study, spring-run chinook salmon restoration will be considered, because they are the most threatened of the chinook salmon runs in the Central Valley that once used the Yuba River, and because the Fish and Game Commission has given "special consideration" to the spring run. This study will also consider restoring steelhead because, like the spring-run chinook, most of their historic spawning and rearing habitat in the Central Valley is now upstream of the dams.

The Yuba River watershed was, historically, one of the most productive habitats for runs of chinook salmon (*Oncorhynchus tshawytscha*) and steelhead rainbow trout (*O. mykiss*). The limited historic evidence indicates that the Yuba River and its tributaries originally offered well over two hundred miles of spawning habitat to salmon and steelhead. While it is impossible to estimate from historical data the numbers of spawning fish, it may have been in excess of 100,000 salmon and several hundred thousand steelhead. Prior to the devastation of the watershed by 19th century hydraulic mining and the subsequent construction of major dams, three runs of chinook salmon (spring, fall, and late fall) were abundant in the Yuba River, as were steelhead (Yoshiyama et al., 1996). Of the nine major Central Valley rivers that feed the San Francisco Bay-Delta, the Upper Yuba offers one of the best opportunities for restoration of salmon and steelhead spawning grounds. (See Exhibit C)

Dams such as Bullards's Bar and Englebright Dam have completely eliminated access to all three forks of the Yuba for migrating fish. About 25 miles of river remain below Englebright Dam, and only part of it is suitable as spawning habitat. Despite the tremendous loss of anadromous fish to dam development, no hatcheries, ladders, elevators or other bypass systems have been built in the Yuba River watershed above Englebright Dam. Restoration, therefore, depends on fish passage.

This proposal is also justified by CalFed, DFG and other state and federal policies. The Department of Fish and Game has endorsed studying the feasibility of reintroducing anadromous fish to above-dam locations on Central Valley rivers, most recently in 1996 when it endorsed a Planning and Conservation League Foundation proposal to CalFed proposing to study fish reintroduction to the American River above Folsom Dam. A copy of DFG's support letter is included in the Appendix as Exhibit D. To date, no such study has been carried out, either for the American or the Yuba.

CalFed's 1998 ERPP recognizes the importance of conducting a feasibility study to examine reintroduction of salmonids to above-dam reaches of Central Valley rivers, as we are proposing here. For salmon, the ERPP's Salmon section expressly states that "lack of adequate corridors between upstream holding, spawning, and rearing habitat in certain tributary streams has impaired or reduced the reproductive potential of some stocks such as spring-run chinook salmon (vol. 1, p. 152)".

The ERPP's steelhead section argues that steelhead are similarly impacted by the same kinds of stressors. "Constructing dams on the larger rivers and streams eliminated access to critical habitat for adults and juveniles ( vol. 1, p. 157. ERPP says "one critical effort will be to conduct the necessary evaluations and analyses to determine the potential benefits and consequences of reintroducing certain steelhead stocks above major dams to provide access to historic spawning and rearing areas. (p. 158)"

Finally, this reconnaissance-level study will begin implementation of the CALFED Bay-Delta Program Programmatic Action 1A in the Feather River/Sutter Basin Ecological Zone Ecosystem Restoration Program Plan: to support efforts to "develop a cooperative program to improve anadromous fish passage in the Yuba River by removing dams or constructing fish ladders, providing passage flows, keeping channels open,...and constructing improved fish bypasses at diversions" (ERPP, Volume II, page 273, attached, Exhibit E)

In addition, this study also advances fish restoration priorities expressed by the state. The study would greatly assist in compliance with existing state law, most notably, Section 6900 (et seq) of the Fish and Game code, which calls for significant increases in the naturally spawning salmonid populations of California. Finally, this project helps meet the objectives of the CVPIA, which seeks a doubling of salmon populations in the Central Valley, by providing the information needed before restoration in the Yuba can begin to release fish into the Valley.

#### f. Monitoring and Data Evaluation

In designing the study protocols, we will work closely with the Department of Fish and Game, the Fish and Wildlife Service, the National Marine Fisheries Service and outside fisheries biologists and provide them with the results of the study for their evaluation and so we can obtain an independent evaluation of the possible benefits of proceeding to the feasibility level. We will share all information gathered in this study with the South Yuba River Citizen's League so SRYCL can apply the data to their investigation of the feasibility of removing Englebright Dam. SYRCL will reciprocate fully with its data on Englebright. If this reconnaissance-level study indicates that it would be wise to proceed to the detailed feasibility level, we will seek a rigorous evaluation of that proposal by both the fisheries and water agencies involved. For a proposed scope of work for a more detailed study, please see Exhibit F). Finally, we will recommend a series of implementation measures which would set forth ways in which post-restoration monitoring of fish passage success should be carried out.

#### g. Implementability

Because this project is a reconnaissance-level feasibility study, no permits or legal clearances will be required prior to or during execution of the work. Climatic conditions will only affect this project to the extent that high water flows make field assessments difficult to commence in June of 1999.

A substantial cross-section of affected stakeholders are supportive of the idea of restoring salmon, steelhead and other fish to the Upper Yuba. This project is supported by the Yuba River Watershed Group MOU, consisting of SYRCL and 17 local, state and federal agencies, organizations and homeowners groups in the upper Watershed. (Please see Exhibit G). SYRCL has begun to work with many of these stakeholders, and hosted a meeting in May to discuss Upper Yuba fish restoration. Strong support for the idea was expressed, and SYRCL has offered to assist the PCL Foundation in working with these and other stakeholders. Significant assistance has also been provided to SYRCL, and is expected from other agencies and organizations, including California Department of Fish & Game, US Fish and Wildlife Service, National Marine Fisheries Service and UC Davis. In addition to the agencies described above, other key water agencies to be included in future discussions include those in Yuba and Sierra Counties, the California Department of Water Resources, the Bureau of Reclamation, and the Corps of Engineers.

## *V. COSTS AND SCHEDULE TO IMPLEMENT THE PROJECT*

### *a. Budget Costs*

The budget for this project is \$159,943. We are requesting one-half of this amount, or \$79,972, from CalFed. This amount will leverage the remaining half, which we are currently requesting from the National Fish and Wildlife Foundation, and which we will request from Prop 204 allocations, and from the Four Pumps allocation. A full project budget is included in the appendix as Exhibit H.

We are applying to CalFed primarily because private foundations and private donors are very unlikely to fund the kind of private sector engineering and consulting biology work that is required to conduct this reconnaissance-level feasibility study. Public sector funding has been set aside for this purpose through CalFed's Category III program and it is therefore appropriate that we apply to CalFed for funding.

On August 1, we will apply to the National Fish and Wildlife Foundation for approximately 25% - 50% of the project costs and, based on conversations with staff at NFWF, we believe we have an excellent chance of securing that portion of the funding. SYRCL, a NFWF grantee and the Planning and Conservation League Foundation have committed to work together, which NFWF has encouraged as a condition for helping fund this project, because it would like to see all three forks of the Yuba studied at the same time. NFWF believes that Yuba's greater political attractiveness (no threat to the Auburn Dam) makes our Yuba proposal much more fundable and has encouraged us to submit this proposal to them. NFWF has a one-month turnaround time, so funding can be in place before CalFed funding is approved. Therefore, once CalFed approves this grant, work can commence immediately.

Incremental funding is possible in this case, but in a limited fashion. The biological assessment for example could be funded to take place first, with engineering happening second. However, engineering assessments cannot happen without the biological data first being available. And the coordination work, because it is project management, must take place simultaneous to the biological and engineering work. The funding feasibility analysis, although it could take place separately from the biological and engineering studies (and, later) is proposed as part of this project because the whole purpose of this work is to produce an analysis of the overall feasibility of reintroducing salmon and steelhead to the Yuba River. Looking at the scientific and engineering feasibility of reintroduction without an assessment of the political and financial feasibility of the proposed methods, would not yield enough data to launch a restoration project.

If CalFed funding were denied, we would not be able to proceed with this project unless NFWF funding, Prop 204 or Four Pumps funding were secured. With only partial funding, we would proceed with the biological analysis, and then reapply to CalFed in the fall for the remaining funding.

No subcontracting will be needed for this project, as the project partners have sufficient existing staffing to carry out the scope of work.

a. Schedule Milestones

The study would be conducted between June 1999 and January 2000. A brief timeline follows:

<u>June</u>	Organization and preparation. Start studies if flows permit.
<u>July</u>	Biology: Initiate North Fork survey. Engineering: Inspect facilities. Review alternatives to bypass Bullard's Bar and Englebright Dams. Coordination: Meetings with interest groups. Prepare draft of funding alternatives report.
<u>August</u>	Biology: Complete North Fork Survey. Engineering: Continue dam bypass work. Coordination: Prepare list of issues of importance to state and local leaders, begin review of ways to respond.
<u>September</u>	Biology: Complete surveys or re-survey sections where needed. Work with engineers to consider fish trapping and transportation program. Engineering: Review alternatives for fish trapping and transportation of out-migrants. Coordination: First draft of responses to state and local concerns. Review draft of funding alternatives.
<u>October</u>	Biology: Consider other biological elements. Review draft of biology report to be transmitted to reviewers. Engineering: Complete and distribute review draft of engineering report. Coordination: Complete and distribute review draft of engineering report.
<u>November-January</u>	Biology: Consider comments of reviewers and prepare final report. Engineering: Consider comments of reviewers and prepare final report. Coordination: Consider comments of reviewers and prepare final report.

CalFed grant payments for this project could be divided into two components. The first would fund the survey and coordination work scheduled between June and September. Following completion of the main body of the field work, the second payment would fund the report drafting, draft circulation and review, stakeholder meetings, and funding feasibility research.

b. Third Party Impacts

This proposal is a reconnaissance-level feasibility analysis which is designed to gather information about the biological, engineering, political and economic feasibility of fish restoration on the North Fork of the Yuba River, including potential third-party impacts related to each of these four areas of study. This study will fully study all significant and likely third-party impacts.

Among the various third-party issues we will study will flow issues, recreational impacts, and the impact of the state and federal endangered species acts if the rare salmon and steelhead runs were restored. Although we anticipate that the ESA probably would not require changes in water project operation, it is still necessary to consider changes in water project operations which would make steelhead and salmon restoration more feasible. These changes would have to be *voluntary on the part of water project operators*, but they could be compensated through a variety of funding mechanisms, including the Central Valley Project Improvement Act, the "December 15" Delta water quality agreement, mitigation funds established by water rights and flood control agreements, the "Four Pumps" agreement, and so on. Finally, we will also examine possible impacts to the recreational users, such as rafters and on commercial users, such as gold-dredgers.

## *VI. APPLICANT QUALIFICATIONS*

### Biology:

The biological assessment will be supervised by Dr. Moyle, who is a leading expert in California fish biology and ecology, specializing in the ecology and conservation biology of California stream fishes. Dr. Moyle has conducted numerous studies like the one proposed here, including investigations of the American River, the Eel River, Putah Creek, Suisun Marsh and elsewhere around the world. Dr. Moyle, who holds a Ph.D. in zoology, is professor in the Wildlife and Fisheries Biology Department of UC Davis, where he has taught and researched since 1972. Moyle has also served as chair of that department. Moyle has received numerous major field research grants, including from the National Science Foundation, the California Department of Water Resources and the U.S. EPA. Moyle serves on several editorial boards, where he oversees the University of California's zoology and fish environmental biology. He has published widely and has served as advisor on special projects to a variety of conservation organizations.

### Engineering

Dr. John Pizzimenti will be the principal investigator on this portion of the study. Dr. Pizzimenti has 16 years of experience with fisheries at hydroelectric projects with Harza. He is Associate of the company and manages the Harza Portland office. For the past 5 years, he has directed Harza's work on the restoration of endangered salmon in the Snake River Basin for the Northwest Power Planning Council and the Bonneville Power Administration. The project received a National Hydropower Association Award in 1995. Prior to joining Harza, he was on the Biology Department faculty of the University of Illinois, Chicago and of the University of Chicago. His Ph.D. is from the University of Kansas in Evolutionary Biology.

Mr. Kevin Malone is an expert on fish passage facilities at large hydroelectric projects and dams. After completing his Masters Degree in fisheries at Central Washington University, he worked on fish passage monitoring, including hydroelectric projects on the Columbia River. He has developed a variety of creative solutions to fish passage facility designs and monitoring programs that comes from years of field experience. His resume includes a patented fish screen, evaluation of PIT (passage integrated transponder) tag restoring data for returning endangered Snake River Salmon, and extensive salmon hatchery and salmon spawning experience.

Mr. Dana Postlewait is an expert in the civil design of juvenile and adult fish passage facilities. He has a degree in civil engineering from the University of Washington and is certified as a Professional Engineer in Washington. He has served as the lead engineer for the design of juvenile salmon facilities at the 300MW Cowlitz Falls Dam. This project involved the restoration of upper basin salmon on the Cowlitz River that had been blocked from migration since the 1960's, when two dams



were constructed on the lower river.

#### Coordination:

Project coordination and funding research will be conducted by Dr. Meral with assistance from a graduate student assistant. The overall program would be coordinated by Dr. Moyle and Dr. Meral, with a third team leader from Harza.

Jerry Meral has been executive director of the Planning and Conservation League Foundation since 1983. Meral received a bachelor's degree in Zoology from the University of Michigan in 1965 and a Ph.D. in Zoology from the University of California, Berkeley, in 1973. Meral oversees all development, long range planning and professional staff activities. Meral oversaw the research and development that led to Propositions 70, 99, 116, 117, 180 and 185. Meral has, for several years, served on CalFed and Prop 204 advisory committees.

From 1975 to 1983, Meral was deputy director of the California Department of Water Resources. In this role, he supervised the Energy and Water Development and Planning Programs, the Office of Water Conservation, and the Delta Planning Program. Previously, Meral served as staff scientist for the Environmental Defense Fund, where he worked as program manager of the Western States Water Program.

#### Conflicts of Interest.

To the best of our knowledge, no conflicts of interest exist with any member of this project team relative to this project, its scope of work, or CalFed.

#### Other Partnerships

The South Yuba River Citizen's League (SYRCL) is submitting, separately, a proposal to study the feasibility of removing or converting Englebright Dam to a dry dam. Englebright is located on the main stem of the Yuba River. SYRCL and the Planning and Conservation League Foundation have agreed to divide the research work so that SRYCL will research the South and Middle Forks of the Yuba, while we investigate the North Fork. The PCL Foundation and SYRCL will share the biological, engineering, funding and stakeholder information gathered in these two studies.

*VII. COMPLIANCE WITH STANDARD TERMS AND CONDITIONS*

We have read and understood the terms and conditions which would apply to a CalFed-Planning and Conservation League Foundation contract to perform the work described in this proposal. We agree to these terms and conditions which would apply to this project, and will be able to comply fully with them.

The relevant forms, as described in the PSP, are attached to this proposal as Exhibit I.

These include:

1. Item 2, Standard Clauses
2. Item 7, Non-Discrimination Compliance Statement
3. Item 10, Non-Collusion Affidavit

**SYRCL**SOUTH YUBA RIVER  
CITIZENS LEAGUE

Exhibit A

July 1, 1998

Mr. Lester Snow  
CALFED Bay Delta Program  
1416 Ninth Street, Suite 1155  
Sacramento, CA 95814

Dear Lester:

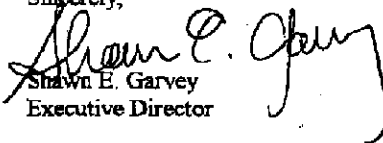
The South Yuba River Citizens League is pleased to support the Planning and Conservation League's proposal to CALFED to study fish passage on the North Yuba River. This proposal works in tandem with the SYRCL proposal submitted to CALFED to implement the CALFED Programmatic Action to conduct a cooperative effort to study decommissioning of Englebright Dam. Englebright is the only obstruction on the Yuba that permanently blocks all salmon and steelhead restoration efforts in the Yuba River Watershed.

These two studies are highly complementary and represent the most comprehensive fish restoration assessment now being proposed for a California watershed. As these two studies proceed over the coming several years, SYRCL and PCL have agreed to share information about the biological, engineering and stakeholder investigations being proposed.

As a member organization of the Planning & Conservation League, SYRCL is pleased to have this opportunity to work with PCL and their partner organizations on such an important proposal.

Please call with any questions about either proposal or our collaborative efforts at CALFED's historic restoration opportunity.

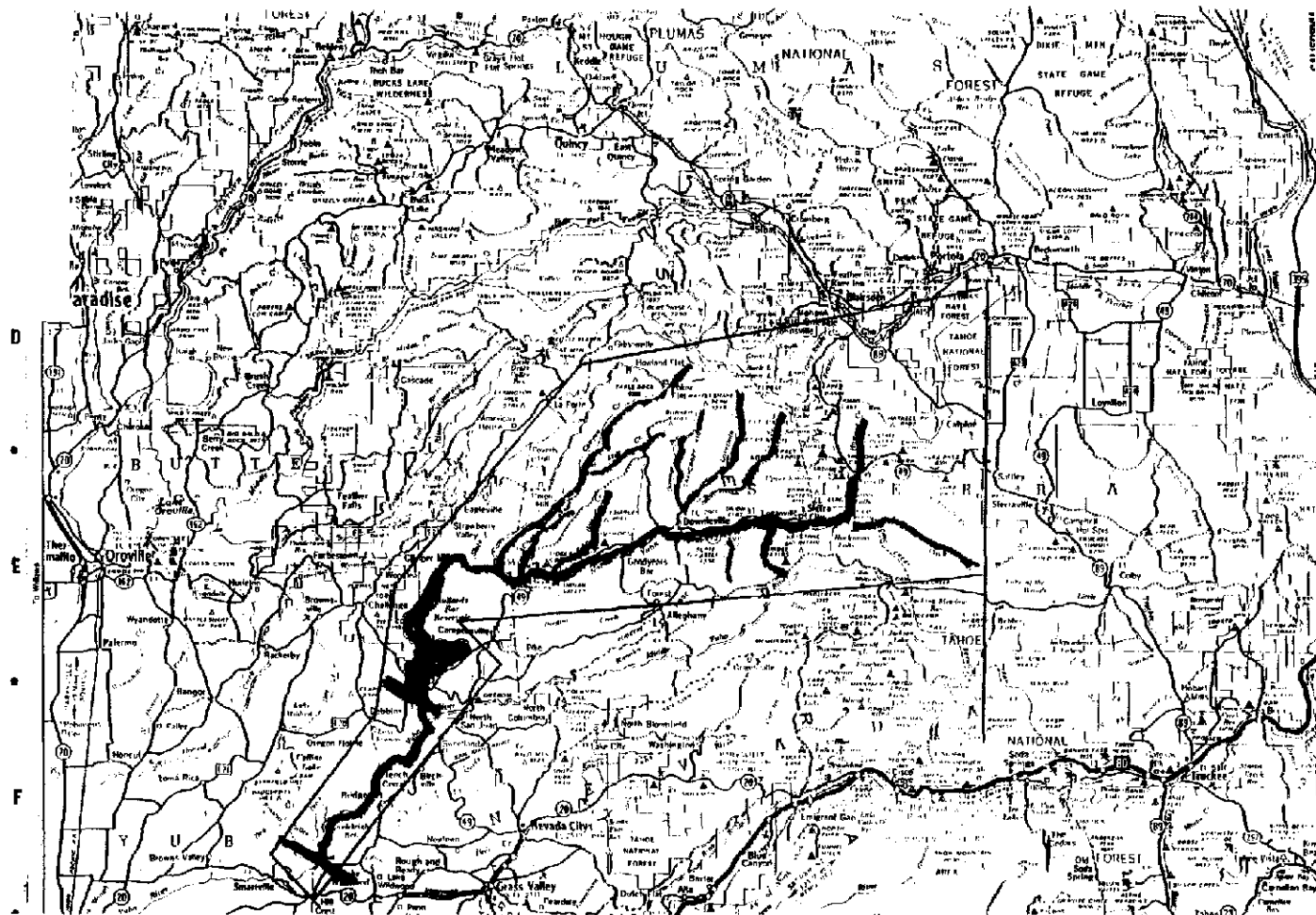
Sincerely,

  
Shawn E. Garvey  
Executive Director

540 Commercial Street, Suite E  
Post Office Box 841  
Nevada City, California 95959  
916/266-8801 • Fax 916/265-0212



Exhibit B



PLANNING AND CONSERVATION LEAGUE FOUNDATION STUDY AREA -  
North Fork, Yuba River -- Fish Passage Assessment

1-008191

1-008191

## RESTORATION POTENTIAL OF THE YUBA AS COMPARED TO OTHER RIVERS

The story of the Yuba is similar to all the other rivers of the Central Valley. But the Yuba ultimately may have a greater potential for salmon and steelhead restoration than any other major Delta tributary. Much of this depends on the relicensing of the river's hydroelectric facilities. A brief review of the other Central Valley rivers follows. In most cases, barriers to restoration by dams are given greatest emphasis, although other factors are mentioned. In most cases, mention of salmon refers to both salmon and steelhead.

**Sacramento** This great river, and its large tributaries the McCloud and the Pit, probably produced more salmon than any other river. Even today, many salmon spawn downstream of Shasta Dam.

Adult salmon would have to be moved upstream around the Keswick Diversion Dam and then over Shasta Dam itself and through immense Shasta Reservoir. Upstream the remaining habitat is largely in the Sacramento River up to Lake Siskiyou, and in the McCloud up to McCloud Reservoir. The Pit is largely stair-stepped with power dams. Furthermore, there are relatively few miles of river involved; perhaps 20-25 miles on each river. There are some large tributaries, such as Squaw Creek, which could host salmon.

A larger problem comes in moving the fish downstream, since they would have to be captured as the Sacramento and McCloud enter Shasta Reservoir.

**Feather** Another river which produced huge numbers of salmon, the Feather presents special challenges for restoration. Upstream migrants would have to pass Thermalito and Oroville Dams. The two most important tributaries are the West Branch and the North Fork. While the North Fork is stair-stepped with hydroelectric dams, the Middle Fork is entirely undammed. But some large natural waterfalls in the Middle Fork make much of the river inaccessible to salmon. About six miles of the South Fork was probably used by salmon.

**American** Described in a previous proposal. Very high restoration potential, but controversy over the proposed Auburn Dam has delayed implementation of the study.

**Mokelumne** This small river has two major dams in a row: Comanche and Pardee, making upstream passage of adults difficult. Almost immediately upstream, a series of hydro diversion dams make the river unusable for salmon.

**Tuolumne** Passage over La Grange and New Don Pedro Dams would be necessary. Passage through New Don Pedro would be difficult since it is so large. Upstream many miles of potential habitat exist. The North, Middle and South Forks all have some potential, although perhaps not far above their confluences with the main river. The Clavey is entirely undammed. There is also access to Cherry Creek, although the Tuolumne itself is cut off at Early Intake Dam. Passage upstream of Early Intake may be blocked by waterfalls even before Pape Valley.

**Merced** Although a relatively small river, the Merced does offer some habitat upstream of Merced Falls and New Exchequer Dams. Salmon apparently passed upstream as far as El Portal on the main stem. They also went up the South Fork about 10 miles, and a short way up the North Fork.

San Joaquin There is apparently considerable restoration potential downstream of Friant Dam, but a recent controversy has surrounded this salmon restoration idea. Since that study has been at least deferred if not permanently halted, there is no sense in considering restoration of salmon upstream of the Dam.

Kings This river is rarely connected to the Delta due to diversions for agriculture.

## DEPARTMENT OF FISH AND GAME

1416 NINTH STREET  
P.O. BOX 944209  
SACRAMENTO, CA 94244-2090  
(916) 653-6194



December 3, 1996

Mr. Lester Snow  
CALFED Bay Delta Program  
1416 Ninth Street, Suite 1155  
Sacramento, California 95814

Dear Mr. Snow:

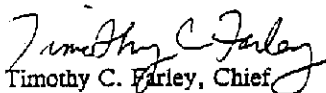
The Department of Fish and Game (Department) has reviewed the proposal from Dr. Gerald Meral of the Planning and Conservation League Foundation (PCL) to assess the biological and technical feasibility of restoring access to historical habitat above Folsom Reservoir for spring-run chinook salmon and steelhead.

Essentially, the proposal is to conduct the first phase of a two-phase feasibility study. This first phase consists of a reconnaissance level study to determine if adequate habitat still exists for anadromous salmonids above Folsom Reservoir, and to determine the possibility of passing adults and juveniles around Nimbus and Folsom dams.

Assessing the feasibility of providing access for steelhead to historical habitats in the American River system is specifically recommended in the Department's *Steelhead Restoration and Management Plan for California*, and we believe the proposal has merit and should be funded. Please note that the Department is not endorsing the reestablishment of salmon and steelhead to the upper American River system, but is endorsing only the procurement of information as outlined in the proposal. We will not make a recommendation to reestablish salmon and steelhead in the upper American River system until many factors are carefully considered; however, we believe it is worthwhile to pursue obtaining this initial information.

If you have any questions, please contact me at (916) 653-6194, or Mr. Dennis McEwan at (916) 653-9442. We can both be reached at the letterhead address.

Sincerely,

  
Timothy C. Farley, Chief  
Inland Fisheries Division

cc: See next page

Mr. Lester Snow  
December 3, 1996  
Page Two

cc: ~~Dr.~~ Gerald Meral  
Planning and Conservation League Foundation  
Sacramento, California

Dr. Peter Moyle  
University of California  
Davis, California

Dr. John Pizzimenti  
Harza Northwest, Inc.  
Portland, Oregon

Mr. Banky Curtis  
Department of Fish and Game  
Rancho Cordova, California

Mr. Dennis McEwan  
Department of Fish and Game  
Sacramento, California



## CHINOOK SALMON



### INTRODUCTION

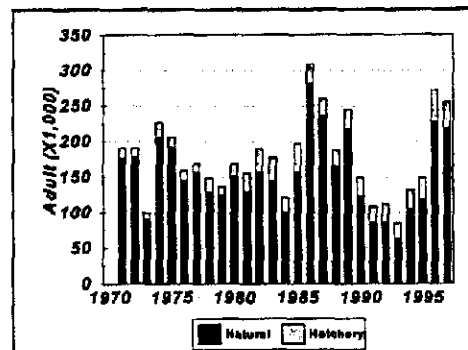
Chinook salmon are medium- to large-bodied fish that spawn in freshwater, migrate to the ocean as juveniles, achieve significant growth, and return to freshwater at varying degrees of sexual maturity. Four runs of chinook salmon are present in the Central Valley, distinguished by their timing of reentry to fresh water: fall, late-fall, winter, and spring (Boydston et al. 1992). Winter-run chinook salmon were formally listed as an endangered species under the California Endangered Species Act in 1989, and as endangered under the federal Endangered Species Act in 1994 (National Marine Fisheries Service [NMFS] 1996). The NMFS is reviewing the status of the other Central Valley chinook salmon runs and considering the potential needs for additional listings under the ESA. Listing of the winter-run chinook population reflected poor ecological health of the Bay-Delta system and placed additional regulatory controls on water management operations in the Central Valley. Water management regulations constrain the water diversion from the Sacramento River, the water export in the Delta, and restrict ocean harvest.

The key to improving chinook salmon populations will be maintaining populations through periods of drought by improving streamflow magnitude, timing, and duration; reducing the effects of the

CVP/SWP export pumps in the southern Delta which alter Delta hydrodynamics, juvenile rearing and migration patterns, and cause entrainment at the facilities, and reducing stressors such as unscreened water diversions, high water temperatures, and harvest of naturally spawned salmon. The overall nature of habitats, flows, and stressors varies greatly throughout the range of chinook salmon in the Central Valley and is influenced by which specific run of salmon is present, its life stage (egg, fry, juvenile, adult), and the season.

### RESOURCE DESCRIPTION

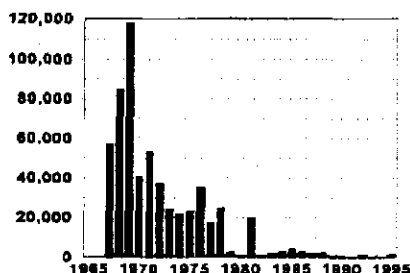
Chinook salmon represent a highly valued biological resource and a significant biological legacy in the Central Valley of California. Central Valley chinook salmon comprise numerous individual stocks, including the Sacramento fall-run, late-fall-run, spring-run, winter-run, and San Joaquin fall-run. The continued existence of Central Valley chinook salmon is closely linked to overall ecosystem integrity and health.



Central Valley Adult Fall-run Chinook Salmon Escapement Estimates for Natural and Hatchery Spawners (PFMC 1997)

Because of their life cycle, typical of all Pacific salmon, Central Valley chinook salmon require high-quality habitats for migration, holding, spawning, egg incubation, emergence, rearing, and emigration to the ocean. These diverse habitats are still present throughout the Central Valley and are successfully maintained to varying degrees by existing ecological processes. Human-caused actions (stressors) have diminished the quality and accessibility of habitats used by chinook salmon. These habitats can be restored through a comprehensive program that strives to restore or reactivate ecological processes, functions, and habitat elements on a systematic basis, while reducing or eliminating known sources of mortality and other stressors that impair the survival of chinook salmon. However, the restoration approach must fully consider the problems and opportunities within each individual watershed and must be fine tuned to meet the requirements of locally adapted stocks.

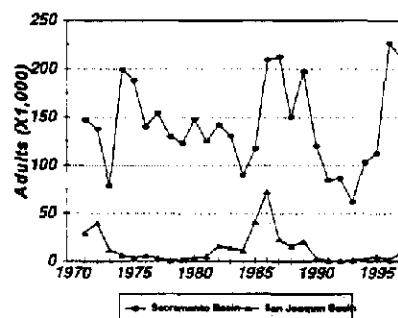
Chinook salmon populations in the Central Valley are at varying degrees of health. Some



Annual escapement estimates for winter-run chinook salmon.

populations, such as the winter-run and spring-run, have declined sharply over the past one to two decades. Winter-run has been designated as an endangered species and the spring-run and San Joaquin fall-run are being considered for listing as threatened. Some populations remain healthy, especially those supplemented with hatchery production.

Overall, the abundances of stocks have varied annually since 1970 and exhibited depressions in run size (escapement) during and following the 1976-1977 and 1987-1992 droughts (Mills and Fisher 1994). Low flows and reservoir storage levels during droughts caused high water temperatures, poor spawning and rearing habitat conditions, high predation rates, high diversion losses, and increased harvest, which in turn reduce salmon survival.



Comparison of the escapement trends of adult fall-run chinook salmon in the Sacramento Basin and the San Joaquin Basin (PFMC 1997).

Chinook salmon are found in virtually all 14 ecological zones that comprise the ERPP Study Area and many of their respective ecological units. Overall, the decline of the chinook salmon population resulted from the cumulative effects of degrading spawning, rearing, and migration habitats in the Sacramento and San Joaquin basins and the Sacramento-San Joaquin Delta. Specifically, the decline was most likely caused by a combination of factors that reduced or eliminated important ecological processes and functions, such as:

- excessively warm water temperatures during the prespawning, incubation, and early rearing periods of juvenile chinook;
- interrupting or blocking the free passage of juveniles and adults at diversion and water storage dams;

- loss of natural emigration cues when flow regimes are altered as a result of the export of water from large diversions in the south Delta;
- heavy metal contamination from sources such as Iron Mountain Mine;
- entrainment in a large number of unscreened and poorly screened diversions; and
- degradation and loss of woody debris, shaded riverine aquatic (SRA) habitat, riparian corridors and forests, and floodplain functions and habitats from such factors such as channelization, levee construction, and land use.

Climatic events and human activity have exacerbated these habitat problems. Lengthy droughts have led to low flows and higher temperatures. Periodic El Niño conditions in the Pacific Ocean have reduced salmon survival by altering ocean current patterns.

Human activities have also contributed to the decline of the chinook, although perhaps to a lesser degree. These activities include the construction and operation of various smaller water manipulation facilities and dams; levee construction and marshland reclamation causing extensive loss of rearing habitats in the lower Sacramento River, San Joaquin River, and Sacramento-San Joaquin Delta; and introduction of predatory species. Ocean and inland recreational and commercial salmon fisheries have probably impaired efforts to rebuild salmon stocks.

Existing regulatory efforts have not adequately maintained some chinook stocks as healthy populations. As a result, the winter-run population was protected under the State and federal ESAs to save it from extinction. Since its listing, some significant habitat improvements have been made to help preserve this and other chinook populations. These include improved water temperatures and flow management for spawning, incubation, and rearing; improved passage of juveniles and adults at diversions and dams on the

upper Sacramento River; reduced diversions during periods when juveniles are most susceptible to entrainment; and the positive-barrier fish screens installed on the larger water diversions along the Sacramento River. However, additional measures that focus on reactivating or improving ecological processes and functions that create and maintain habitats will be necessary for recovery of the various chinook salmon stocks in the Central Valley.

Rebuilding chinook populations to a healthy state will require a coordinated approach to restoring ecosystem processes and functions, restoring habitat, reducing or eliminating stressors on a site-specific basis, and improving management and operation of the five salmon hatcheries in the Central Valley.

## VISION

The vision for Central Valley chinook salmon is to achieve naturally spawning population levels that support and maintain ocean commercial and ocean and inland recreational fisheries, and that fully use existing and restored habitats. This vision will contribute to the overall species diversity and richness of the Bay-Delta system and reduce conflict between protection for this species and other beneficial uses of water and land in the Central Valley.

This vision is consistent with restoring the Sacramento River winter-run chinook salmon to levels that will allow it to be removed from the State and federal endangered species lists; increasing populations of other chinook stocks to levels that eliminate any future need for protection under the State and federal Endangered Species Acts (ESAs); and providing population levels for all chinook stocks that sustain recreational and commercial fisheries and other scientific, educational, and nonconsumptive use of these valuable resources.

Within the broad context of ecosystem restoration, salmon restoration will include a wide variety of efforts, many of which are being implemented for other ecological purposes or which are not specific to chinook salmon. For example, restoring riparian woodlands along the Sacramento River between Keswick Dam and Verona will focus on natural stream meander, flow, and natural revegetational/successional processes. These factors will be extremely important in providing SRA habitat, woody debris, and other necessary habitats required by food organisms and juvenile and adult salmon populations.

Another example is to reactivate tidal flows into fresh and brackish (somewhat salty) marshes. Reactivating the tidal exchange in marshes will greatly increase the production of lower trophic organisms, thereby improving the foodweb. Reactivating tidal exchange will also substantially increase the complexity of nearshore habitats in the lower mainstem rivers, the Delta, and the Bay, which will be valuable habitats for juvenile salmon.

Operating the water storage and conveyance systems throughout the Central Valley for their potential ecological benefits can be one of the more important elements in restoring a wide spectrum of ecological resources, including chinook salmon.

Harvest management will play an important role in restoring healthy salmon populations. The Ecosystem Restoration Program Plan (ERPP) anticipates a highly compatible relationship between restoring ecological processes and harvest management recommendations. Ecological processes selected for restoration include those that create and maintain critical habitat elements. Harvest management recommendations focus on rebuilding naturally spawning stocks.

Lack of adequate corridors between upstream holding, spawning, and rearing habitat in certain tributary streams has impaired or reduced the reproductive potential of some stocks such as spring-run chinook salmon. Unscreened diversions

are widespread in the Central Valley and are a known source of mortality to chinook salmon.

Many action-oriented activities are underway in the Central Valley that will assist in achieving the vision for chinook salmon. Some are short-term actions and some are long-term evaluations. All are designed to eliminate stressors and improve ecological processes and habitats.

## INTEGRATION WITH OTHER RESTORATION PROGRAMS

There are three major programs to restore chinook salmon populations in the Central Valley.

- Central Valley Project Improvement Act: The Secretary of the Interior is required by the Central Valley Project Improvement Act to double the natural production of Central Valley anadromous fish stocks by 2002 (USFWS 1995).
- Endangered Species Recovery Plan. The National Marine Fisheries Service is required under the federal ESA to develop and implement a recovery plan for the endangered winter-run chinook salmon and to restore the stock to levels that will allow its removal from the list of endangered species (NMFS 1996).
- Salmon, Steelhead Trout and Anadromous Fisheries Program Act: The California Department of Fish and Game (DFG) is required under State legislation (the Salmon, Steelhead Trout and Anadromous Fisheries Program Act of 1988) to double the numbers of salmon that were present in the Central Valley in 1988 (Reynolds et al. 1993).

Each of the major chinook salmon restoration/recovery programs has developed specific goals for Central Valley chinook salmon stocks. ERPP embraces each of the restoration/recovery goals and will contribute to

each agency's program by restoring critical ecological processes, functions, and habitats, and reducing or eliminating stressors.

## LINKAGE WITH OTHER ECOSYSTEM ELEMENTS

Chinook salmon are closely dependent on ecological processes and habitats and adversely affected by a variety of stressors.

Important ecological processes that directly influence the health of chinook salmon or its habitat include:

- Central Valley streamflows,
  - Natural sediment supply,
  - Stream meander corridors,
  - Natural floodplain and flood processes,
  - Central Valley stream temperatures,
  - Bay-Delta hydraulics,
  - Bay-Delta aquatic foodweb, and
  - Upper watershed health and function.
- Habitats used by chinook salmon during their juvenile or adult life stages include:
- Tidal perennial aquatic habitat,
  - Delta sloughs,
  - Midchannel islands and shoals,
  - Saline and fresh emergent wetlands, and
  - Riparian and riverine aquatic habitats.

Stressors that adversely affect chinook salmon or its habitats include:

- Water diversions,
- Dams, reservoirs, weirs, and other human-made structures,
- Levees, bridges, and bank protection,
- Dredging and sediment disposal,
- Gravel mining,
- Predation and competition,
- Contaminants,
- Harvest,
- Some aspects of artificial propagation programs, and
- Disturbance.

## IMPLEMENTATION OBJECTIVE, TARGETS, AND PROGRAMMATIC ACTIONS

The implementation objective for chinook salmon is to ensure the recovery of the Sacramento winter-run chinook salmon, a species listed as endangered under the federal and California Endangered Species Acts (ESAs). Recovery of the winter-run chinook salmon would ensure overall species richness and diversity and reduce conflict between the need for its protection and other beneficial uses of water in the Bay-Delta. The objective is also to ensure the restoration of Sacramento fall-run chinook, spring-run chinook, late-fall-run chinook, and San Joaquin fall-run chinook to support sustainable sport and commercial fisheries.

The overall target for chinook salmon is presented as a strategy to increase the survival and return of each generation. ERPP's approach is to contribute to managing and restoring each stock with the goal of maintaining cohort replacement

rates of much greater than 1.0 while the individual stocks are rebuilding to desired levels. When the stocks approach the desired population goals, ERPP will contribute to maintaining a cohort replacement rate of 1.0. In practical application, management and restoration goals need to be developed on a stream-specific basis and include all runs of chinook salmon.

The strategy for achieving the chinook salmon vision includes protecting existing populations, restoring ecological processes, improving habitats, and reducing stressors. The following actions would improve chinook salmon populations:

- Restore ecological processes in the Central Valley. Chinook salmon are dependent on adequate streamflows; gravel recruitment, transport, and cleansing; low water temperatures; and channel configurations.
- Maintain adequate streamflows to improve gravel recruitment, transport, and cleansing; water temperatures; and channel conditions. Improved streamflow would also provide attraction flows for adult salmon migrating upstream to spawning grounds through the Bay, Delta, and lower rivers. Flows also support downstream transport for juvenile salmon migrating to the ocean and minimize losses to diversions and predators. Short-term improvements in flows may be possible with existing supplies. Necessary changes in streamflows may require long-term water supply improvements.
- Restore habitats required by chinook salmon. Where ecological processes cannot restore habitats to the desired level, habitats can be improved using direct measures. Important habitat components for chinook salmon include spawning gravel, water temperatures, and access to spawning habitats. In the short term, gravel can be introduced to rivers where needed. Fish passage facilities can be upgraded where deficient. Generally, habitat quality and availability along the lower reaches of the major rivers and in the Delta have been

greatly diminished by the construction of levees; construction of levees that isolated rivers from their floodplains; and removal or other loss of riparian, shaded riverine, and woody debris habitats. A major long-term commitment will be required to restore the habitats in these areas.

- Protect existing populations in the Central Valley. The ERPP focuses on supporting efforts to protect existing natural populations of chinook salmon by limiting harvest of naturally spawned fish while emphasizing the harvest of hatchery-produced fish. A short-term action would be to evaluate mass marking of all hatchery-produced chinook salmon and limiting harvest to only marked salmon. Another short-term action would be to alter existing hatchery practices that do not embody the concepts of genetic conservation. A long-term action may involve restrictions on harvest gear, seasons, and fishing areas in commercial and sport fisheries.
- Eliminate stressors that cause direct or indirect mortality of chinook salmon. Important stressors on chinook salmon include insufficient streamflow, high water temperatures, blockages at diversion dams, predation near human-constructed structures, contaminants, unscreened diversions, and harvest. ERPP focuses on reducing each of these stressors in the short term and eliminating the conditions that bring about the stress factors in the long term by restoring natural processes and eliminating stressors where feasible.

## REFERENCES

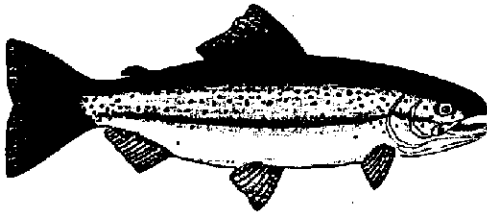
- Boydston, L.B., R.J. Hallock, and T.J. Mills. 1992. Salmon in California's living marine Resources and their utilization. W.S. Leets, C.M. DeWees, and C.W. Haugen eds. Sea Grant Publication UCSGEP-92-12. 257 p.



CALIFORNIA  
DELTA  
PROGRAM

Volume I: Ecosystem Restoration Program Plan  
Vision for Chinook Salmon  
Draft: March 1998

## STEELHEAD TROUT



### INTRODUCTION

Steelhead trout are an anadromous form of rainbow trout. This species spawns in freshwater, its juveniles rear in cool water for a year or more before migrating to the ocean. Steelhead spend one to three years in the ocean before maturing and returning inland to spawn. Because of their life cycle, young steelhead are susceptible to mortality resulting from water temperatures.

Annual counts of steelhead, taken at Red Bluff Diversion Dam, suggest that the recent spawning populations are less than 10,000 adult fish. This is a substantial decline from the estimated 30,000 fish that returned to Central Valley rivers and streams in the early 1960s (Mills et al. 1996, Mills and Fisher 1994).

### RESOURCE DESCRIPTION

Rainbow trout exhibit one of the most complex life histories of any salmonid species. Those that exhibit anadromy (i.e., migrate as juveniles from fresh water to the ocean and then return to spawn in fresh water as adults) are called steelhead, and those that reside their entire lives in fresh water are called rainbow trout. Steelhead typically migrate

to ocean waters after spending 1-3 years in fresh water. They reside in marine waters for typically 2 or 3 years before returning to their natal stream to spawn as 3- to 5-year-old fish. Unlike Pacific salmon, steelhead are iteroparous (i.e., they are capable of spawning more than once before they die). However, postspawning survival rates are generally low, thus the percentage of adults in the population that spawn more than once is low. It is likely that steelhead and resident forms interbreed, thus forming a single population in streams where they coexist.

Biologically, steelhead can be divided into two reproductive ecotypes according to their state of sexual maturity at the time of river entry, the duration of their spawning migration, and behavior. These two ecotypes are termed "stream maturing" and "ocean maturing." Stream maturing steelhead enter fresh water in a sexually immature condition and require several months to mature and spawn. Ocean-maturing steelhead enter fresh water with well-developed gonads and spawn shortly thereafter. These two reproductive ecotypes are more commonly referred to by their season of freshwater entry (i.e., summer-run and winter-run steelhead). Central Valley steelhead stocks are typically of the ocean-maturing type and are called winter-run steelhead. Some evidence suggests that summer-run steelhead were once present but that construction of large dams on major tributaries, which would have blocked adults from reaching the deep pools they need to overwinter, most likely eliminated these populations.

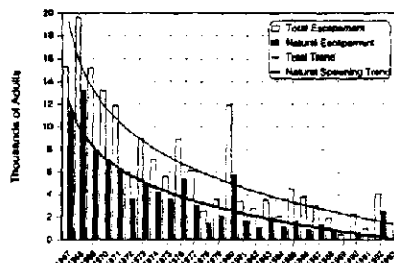
The National Marine Fisheries Service (NMFS) has identified steelhead populations in the Central Valley as composing a single evolutionary significant unit (ESU). ESUs are defined using a variety of physical and biological data, including the physical environment (geology, soil type, air temperature, precipitation, riverflow patterns, water temperature, and vegetation); biogeography (marine, estuarine, and freshwater fish

distributions); and life history traits (age at smolting, age at spawning, river entry timing, spawning timing, and genetic uniqueness).

The Central Valley steelhead ESU comprises the Sacramento and San Joaquin Rivers and their tributaries. Recent data from genetic studies show that samples of steelhead from Deer and Mill Creeks and Coleman National Fish Hatchery on Battle Creek are well differentiated from all other samples of steelhead from California.

In reviewing the status of Central Valley steelhead, NMFS concluded that ESU is in danger of extinction because of the widespread degradation, destruction, and blockage of freshwater habitats and the potential results of continuing habitat destruction, water allocation problems, and interactions between introduced and native stocks.

FIGURE 1. Sacramento River Steelhead Adjusted Counts at Red Bluff Diversion Dam



Steelhead are somewhat unique in that they depend on essentially all habitats of a river system. Steelhead use the estuary for rearing and adapting to saltwater. The main channel is used for migrating between the ocean and upstream spawning and rearing areas. The tributaries are used for spawning and rearing. They are, therefore, found in virtually all ecological zones and many of their respective ecological units.

Overall, the decline of the steelhead trout population resulted from the cumulative effects of degrading habitats and environmental processes and functions. Constructing dams on the larger rivers and streams eliminated access to critical

habitat for adults and juveniles. Excessively warm water temperatures during the prespawning, incubation, and early rearing period of juvenile steelhead; interrupting or blocking the free passage of juveniles and adults at diversion dams; losing natural emigration cues is attributable to altered flow regimes resulting from the export of water from large diversions in the south Delta. A large number of unscreened and poorly screened diversions entrain (capture) fish as they are migrating. Channelization, levee construction, and land use have led to degradation and loss of woody debris, shaded riverine aquatic, riparian corridors and forests, and floodplain functions and habitats.

A host of other factors has also contributed to the decline of the steelhead trout, but perhaps to a lesser degree. These include the various smaller water diversion facilities and dams; extensive loss of rearing habitats in the lower Sacramento River, San Joaquin River, and Sacramento-San Joaquin estuary through levee construction and marshland reclamation; and the interaction and predation by non-native species.

## VISION

The vision for Central Valley steelhead trout is to achieve naturally spawning populations of sufficient size to support inland recreational fishing and that fully use existing and restored habitat areas. Achieving this vision will primarily require restoring degraded spawning and rearing habitats, enhancing fish passage to historic habitat, and supporting angling regulations consistent with steelhead trout population recovery. This vision is consistent with restoring populations of steelhead to levels that eliminate the need for any future protection under the State and federal Endangered Species Acts (ESAs). To achieve this vision, ecological functions and processes that create and sustain steelhead habitats would be maintained and restored and stressors and known sources of mortality would be reduced or eliminated.



The strategy for attaining this vision is to restore degraded spawning and rearing habitat in tributaries; restore access to historic habitat that is partially or completely blocked; support angling regulations consistent with restoring ecosystem processes and functions; support additional research to address large deficiencies in information regarding steelhead freshwater and ocean life history, behavior, habitat requirements, and other aspects of steelhead biology; and provide opportunities for angling and nonconsumptive uses.

In addition, the strategy includes operating Central Valley hatcheries to protect and maintain the existing genetic diversity of naturally spawning populations and provide hatchery-produced fish for a healthy recreational fishery.

NMFS has recommended general conservation measures for steelhead throughout their Pacific coast range. These conservation measures, when applied to the Central Valley, include the following:

- Implement land management practices that protect and restore habitat. Existing practices that may affect steelhead include timber harvest, road building, agriculture, livestock grazing, and urban development.
- Review existing harvest regulations to identify any changes that would further protect Central Valley steelhead.
- Incorporate practices to minimize impacts on native populations of steelhead into hatchery programs.
- Make provisions at existing dams to allow the upstream passage of adult steelhead.
- Provide adequate headgate and staff gage structures at water diversions to control and effectively monitor water usage, and enforce water rights.

- Screen irrigation diversions affecting downstream migrating steelhead.

Within the broad context of ecosystem restoration, steelhead restoration will include a wide variety of efforts, many of which are being implemented for other ecological purposes or which are not specific to steelhead trout. For example, restoration of riparian woodlands along the Sacramento River between Keswick Dam and Verona will focus on natural stream meander, flow, and natural revegetation/successional processes. These will be extremely important in providing shaded riverine aquatic habitat, woody debris, and other necessary habitats required by lower trophic organisms and juvenile and adult steelhead populations.

Operation of the Central Valley water storage and conveyance systems for their potential ecological benefits can be one of the more important elements in restoring a wide spectrum of ecological resources, including steelhead trout.

Inadequate connectivity between upstream holding, spawning, and rearing habitat in certain tributary streams has impaired or reduced the reproductive potential of some steelhead stocks. Providing stream flows, improving fish ladders, and removing dams will contribute to efforts to rebuild steelhead populations.

One critical effort will be to conduct the necessary evaluations and analyses to determine the potential benefits and consequences of reintroducing certain steelhead stocks above major dams to provide access to historic spawning and rearing areas. The potential transfer of adult fish above the dams may be straightforward, but the successful emigration downstream by juveniles cannot be ensured. Juvenile salmonid passage at large dams in the Columbia River basin has had little success and the viability of this option to protect and restore naturally spawning steelhead trout in the Central Valley is unknown.

## INTEGRATION WITH OTHER RESTORATION PROGRAMS

Two major programs to restore steelhead trout populations exist within the Central Valley. The U.S. Fish and Wildlife Service's goal, as established by the Central Valley Project Improvement Act is to double the natural production of Central Valley anadromous fish stocks by 2002 (USFWS 1995). The California Department of Fish and Game is required under State legislation (The Salmon, Steelhead Trout and Anadromous Fisheries Program Act of 1988) to double the numbers of steelhead estimated to have been present in the Central Valley in 1988 (McEwan and Jackson 1996, Reynolds et al. 1993, and McEwan and Nelson 1991).

Each of these steelhead trout restoration programs has developed specific restoration goals for Central Valley steelhead trout stocks. Implementation of the steelhead vision strategy will contribute to each agency's program through the restoration of critical ecological processes and functions, restoration of habitats, and reduction or elimination of stressors:

## LINKAGE WITH OTHER ECOSYSTEM ELEMENTS

Steelhead trout are closely dependent on ecological processes and habitats and adversely affected by a variety of stressors.

Important ecological processes the directly influence the health of steelhead trout or its habitat include:

- Central Valley streamflows,
- Natural sediment supply,
- Stream meander corridors,
- Natural floodplain and flood processes,

- Central Valley stream temperatures,
- Bay-Delta hydraulics,
- Bay-Delta aquatic foodweb, and
- Upper watershed health and function.

Habitats used by steelhead trout during their juvenile or adult life stages include:

- Tidal perennial aquatic habitat,
- Delta sloughs,
- Midchannel islands and shoals,
- Saline and fresh emergent wetlands, and
- Riparian and riverine aquatic habitats.

Stressors that adversely affect steelhead trout or its habitats include:

- Water diversions,
- Dams, reservoirs, weirs, and other human-made structures,
- Levees, bridges, and bank protection,
- Dredging and sediment disposal,
- Gravel mining,
- Predation and competition,
- Contaminants,
- Harvest, and
- Artificial propagation programs.

## IMPLEMENTATION OBJECTIVE, TARGETS, AND PROGRAMMATIC ACTIONS

The implementation objective for steelhead trout is to ensure the recovery of this species, which is proposed for listing under the federal Endangered Species Act (ESA), to sufficient population size to support inland recreational fishing and fully use existing and restored habitat areas in order to contribute to overall species richness and diversity and reduce conflict between the need for its protection and other beneficial uses of water in the Bay-Delta.

The short-term approach for restoring steelhead populations is to support the management and restoration of each stock to maintain the to the adult population at a ratio much greater than 1.0 while the individual stocks are rebuilding to desired levels. Recruitment rates greater than 1.0 indicate that the number of young fish reaching adulthood exceeds the size of the parental population that produced them.

The long-term approach is to contribute to maintaining cohort replacement rates at 1.0 when the stocks approach the desired population goals.

The following actions would help to achieve the short- and long-term restoration of Central Valley steelhead populations:

- Implement a coordinated approach to restore ecosystem processes and functions.
- Implement measures to restore habitat when restoration of ecosystem processes and functions is not feasible.
- Protect spawning and rearing habitat in upper tributary watersheds.
- Improve riparian corridors in lower tributaries and rivers.

- Improve estuary habitat.
- Manage and operate the four hatcheries in the Central Valley that propagate steelhead in order to protect the genetic diversity of naturally and hatchery produced stocks.
- Provide sufficient flows in lower tributaries for immigration and emigration to improve migration success.
- Reduce losses to unscreened diversions.
- Reduce fish mortality in the recreational fishery.
- Implement programmatic actions proposed in the 14 ecological zone visions to help achieve steelhead targets by creating and sustaining improved habitat conditions and reducing sources of mortality.

## REFERENCES

- McEwan, D. And T.A. Jackson. 1996. Steelhead Restoration and Management Plan for California. California Department of Fish and Game. 234 p.
- McEwan, D., J. Nelson. 1991. Steelhead restoration plan for the American River. Department of Fish and Game. 40 p.
- Mills, T.J., D.R. McEwan, and M.R. Jennings. 1996. California salmon and steelhead: beyond the crossroads, p. 91-111. In D. Stouder, P. Bisson, and R. Naiman. (eds.), Pacific salmon and their ecosystems: status and future options. Chapman and Hall, New York.
- Mills, T.J. and F. Fisher. 1994. Central Valley anadromous sport fish annual run-size, harvest, and population estimates, 1967 through 1991. California Department of Fish

**PROGRAMMATIC ACTION 3A:** Develop a cooperative program to evaluate and screen diversions in the Feather River to protect all anadromous fish life stages.

***RATIONALE:** Water diversion, storage, and release in the watershed directly affect fish, aquatic organisms, and nutrient levels in the system and indirectly affect habitat, foodweb production, and species abundance and distribution. Unscreened diversions cause direct mortality to young fish; the level of mortality is likely influenced by the number of young fish present, diversion size, and diversion timing.*

#### **DAMS, RESERVOIRS, WEIRS, AND OTHER STRUCTURES**

**IMPLEMENTATION OBJECTIVE:** The implementation objective for dams, reservoirs, weirs, and other structures is to increase the upstream spawning and rearing habitat connection with the mainstem rivers in the Sacramento-San Joaquin basin. This would increase success of adult spawners and survival of juvenile downstream migrants.

**TARGET 1:** Increase adult and juvenile anadromous fish passage in the Yuba River by providing access to 100% of the available habitat below Englebright Dam (◆◆◆).

**PROGRAMMATIC ACTION 1A:** Develop a cooperative program to improve anadromous fish passage in the Yuba River by removing dams or constructing fish ladders, providing passage flows, keeping channels open, eliminating predator habitat at instream structures, and constructing improved fish bypasses at diversions.

**PROGRAMMATIC ACTION 1B:** Facilitate passage of spawning adult salmonids in the Yuba River by maintaining appropriate flows through the fish ladders or modifying the fish ladders at diversion dams.

**PROGRAMMATIC ACTION 1C:** Conduct a cooperative study to determine the feasibility of

removing Englebright Dam on the Yuba River to allow chinook salmon and steelhead access to historical spawning and rearing habitats.

**TARGET 2:** Improve chinook salmon and steelhead passage in the Bear River by providing access to 100% of the available habitat below the SSID diversion dam (◆◆).

**PROGRAMMATIC ACTION 2A:** Improve chinook salmon and steelhead passage in the Bear River by negotiating with landowners to remove or modify culvert crossings on the Bear River.

***RATIONALE:** Dams and their associated reservoirs block fish movement, alter water quality, remove fish and wildlife habitat, and alter hydrologic and sediment processes. Other structures may block fish movement or provide habitat or opportunities for predatory fish and wildlife, which could be detrimental to fish species of special concern.*

#### **LAND USE**

**IMPLEMENTATION OBJECTIVE:** Promote rangeland management practices and livestock stocking levels to maintain high-quality habitat conditions for wildlife, aquatic, and plant communities; protect special-status plants; protect riparian vegetation; maintain shaded riverine aquatic habitat; and prevent bank erosion.

**TARGET 1:** Protect, restore, and maintain ecological functions and processes in the Feather, Yuba, and Bear River watershed by eliminating conflicts between land use practices and watershed health (◆).

**PROGRAMMATIC ACTION 1A:** Work with landowners, land management agencies, and hydropower facility operators to protect and restore the watershed.

**PROGRAMMATIC ACTION 1B:** Work with landowners, land management agencies, and hydropower facility operators to increase chinook salmon and steelhead survival in the Feather, Yuba, and Bear Rivers and the Sutter Basin.

## PHASE II, FEASIBILITY-LEVEL STUDY

While funding is not currently being sought for this phase of the study, it is important to examine what the result of a favorable outcome of the first study (reconnaissance) phase would be. If restoration appears to be practical from the biological, engineering, and economic point of view, the feasibility level study would include at least the following elements:

**Biology** All rivers and streams in the North Fork Yuba watershed would be surveyed for their salmon and steelhead potential. The actual possible production of adult fish would be estimated, developed from the number of out-migrants which could be successfully passed to the ocean. Conflicts with other native fish would be considered. A biological advisory committee would be established to review the feasibility of the proposal.

**Engineering** A feasibility level cost estimate would be prepared of the cost of upstream fish passage facilities, including one or more alternatives for passage around each obstacle. A similar level estimate would be made of the cost of fish collection facilities on the North Fork, as well as any necessary fish transportation and release facilities.

**Coordination** An advisory committee made up of those interests described above would be established to help determine the parameters under which a restoration plan could operate. Special attention would be given to the power and water impacts of the proposal.

**Economics** While a formal cost-benefit analysis is difficult to undertake for a salmon and steelhead restoration project, the economic benefits of adding additional adult salmon to the salmon harvest would be compared to the actual project costs. Additional consideration would be given to the tourism benefits of having salmon and steelhead in the Yuba River, and the less tangible but no less real benefits of restoring California's premiere native fish to its original habitat. The sport fishing value, especially for steelhead would also be evaluated.

**Funding** A thorough examination would be made of all possible funding sources, including extensive discussions with the administrative and political leaders who control those funds.

**Recommended Plan** A recommended plan would be prepared based on the above elements.

**Timing** The feasibility level study would probably take about two years. A budget estimate has not yet been prepared.



United States  
Department of  
Agriculture

Natural  
Resources  
Conservation  
Service

Grass Valley Service Center  
113 Presley Way, Suite 1  
Grass Valley, CA 95945  
(530)272-3417

July 1, 1998

To: CALFED - Watershed Management

Subject: Proposal - Assessment of the South Yuba River Category III Program

The Proposition 204 Steering Committee for Nevada County at their June 24, 1998 meeting gave a unanimous vote to broaden the scope of the Proposition 204 MOU to accommodate the CALFED objectives. Not only did they vote to support the CALFED proposal, but they also voted to support the long-term project goal of developing a coordinated watershed management and implementation plan for the South Yuba River (Phases II - IV), with input and involvement by the MOU group.

The Yuba River has been one of the most used and abused rivers in the Sierra Nevada. The South Yuba River Citizens League, in cooperation with the Yuba Watershed Restoration Group, is dedicating its efforts to improve conditions in the watershed, and therefore water quality, which will benefit the Bay Delta. Their study will help determine the feasibility of removing Englebright Dam to allow salmon and steelhead access to historical spawning and rearing habitats.

We definitely support this proposal and request your approval.

Ron Zinke  
District Conservationist and Committee Chair

Attachment

The United States Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require assistance to participate in USDA programs, services, or activities should contact USDA's TARGET Center at 202-720-2600 (voice and TDD). To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 3189, WPHH Building, 14th and Independence Avenues, NW, Washington, DC 20250-8010 or call (202) 720-6394 (voice or TDD). USDA is an equal opportunity provider and employer.

## MEMORANDUM OF UNDERSTANDING

Between the

Nevada County Resource Conservation District, County of Nevada, US Forest Service, USDA Natural Resources Conservation Service, California Department of Forestry and Fire Protection, California State Parks, Northern Sierra Air Quality Management District, North San Juan Fire Protection District, Yuba Watershed Institute, South Yuba River Citizens League, City of Nevada City, Bureau of Land Management, Nevada County Superintendent of Schools Office, Friends of Deer Creek.

This Memorandum of Understanding (MOU) is made and entered into between the above signatories.

### I. PURPOSE

The purpose of this MOU is to establish a framework upon which the parties may cooperatively plan mutually beneficial work projects and activities envisioned by the State of California Proposition 204, California Water Code, Division 24, Safe, Clean, Reliable Water Supply Act, Article 5, Delta Tributary Watershed Program.

### II. INTRODUCTION

WHEREAS, all parties have a mutual interest in developing watershed rehabilitation projects to protect regional water quality and corresponding watershed properties for the public good; and

WHEREAS, all parties have the public responsibility to identify and take corrective actions where water quality may become degraded; and

WHEREAS, all parties administer properties that are eligible for grants provided under the Delta Tributary Watershed Program.

NOW, THEREFORE, in consideration of the above premises, the parties hereto agree as follows:


### III. PARTIES AGREE TO

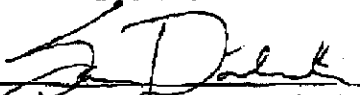
1. Actively pursue opportunities for mutually beneficial work projects or activities that fit under the Delta Tributary Watershed Program.
2. Enter into supplemental agreements or other legal instruments with each other to implement any grant funding received under the auspices of this program.

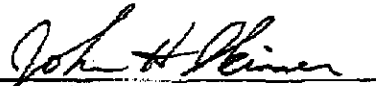
## IV. GENERAL TERMS AND CONDITIONS

1. This agreement is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the parties to this instrument will be handled in accordance with applicable laws, regulations, and procedures including those for Government procurement. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the parties and shall be independently authorized by appropriate statutory authority. This instrument does not give that authority.
2. Modifications within the scope of this instrument shall be made by the issuance of a bilaterally executed modification prior to any changes being performed.
3. This instrument in no way restricts any signatory party from participating in similar activities with other public or private agencies, organizations and individuals.
4. Any signatory party, in writing, may request termination of their participation at any time before the date of expiration.

This instrument is executed as of the last date shown below and will expire on September 30, 2001, at which time it will be subject to review, renewal, or expiration.

 12/18/97  
Kerry Arnett, President  
Nevada County Resource Conservation District

 1/6/98  
Regg Atkinson, Chairman, San Dardick  
Nevada County Board of Supervisors

 12/19/97  
John Skinner, Forest Supervisor  
US Forest Service, Tahoe National Forest

 12-22-97  
Ron Zinke, District Conservationist  
USDA Natural Resources Conservation Service



Jim Marchio 12-18-97  
 Jim Marchio, Unit Chief  
 California Department of Forestry and Fire Protection

I. Ray Patton  
 I. Ray Patton, Park Superintendent  
 California State Parks

Rodney A. Hill 12/18/97  
 Rodney A. Hill, Air Pollution Control Officer -  
 Northern Sierra Air Quality Management District

Charlotte Kilgrew 12/16/97  
 Charlotte Kilgrew, Chairperson, Board of Directors  
 North San Juan Fire Protection District

Bob Erickson 12/17/97  
 Bob Erickson, President, Yuba Watershed Institute

Roger Hicks 12/24/97  
 Roger Hicks, President, Board of Directors  
 South Yuba River Citizens League

Harry Stewart 12/17/97  
 Harry Stewart, Mayor, City of Nevada City

Deane Swickard 12/24/97  
 Deane Swickard, Field Manager  
 Bureau of Land Management

Terence McAteer 12/18/97  
 Terence McAteer, Superintendent of Schools, Nevada County

Mary Anne Kreshka 12/16/97  
 Mary Anne Kreshka, Chairperson, Friends of Deer Creek

**PROJECT BUDGET - North Fork Yuba River Fish Passage Feasibility Study**

Planning and Conservation League Foundation - 1998

							SOURCES OF PROJECT FUNDS		
	Direct Labor Hours	Direct Salary & Benefits	Overhead ***	Material & Acquisition Contracts	Misc. & Other Direct Costs	Total Costs	Cal Fed	NFWF & Other Fndns	Prop 204, 4-Pumps, & Others
							50%	25%	25%
<b>BIOLOGY</b>									
	(\$74/hr)	\$ 38,896	\$ 16,725	\$ 6,928	\$ 2,431	\$ 64,980	32,490	16,245	16,245
Task 1**	58	4,279	1,840	762	267	7,148	3,574	1,787	1,787
Task 2	84	6,223	2,676	1,108	389	10,387	5,198	2,599	2,589
Task 3	53	3,890	1,673	693	243	6,498	3,249	1,625	1,625
Task 4	116	8,557	3,680	1,524	535	14,296	7,148	3,574	3,574
Task 5	110	8,168	3,512	1,455	511	13,646	6,823	3,411	3,411
Task 6	53	3,890	1,673	693	243	6,498	3,249	1,625	1,625
Task 7	53	3,890	1,673	693	243	6,498	3,249	1,625	1,625
*** overhead = indirect costs, calculated at 43% of salary (UC Davis standard rate)									
<b>ENGINEERING</b> <i>Cannot be completed separately from Biology Investigation)</i>									
	(\$116/hr)	\$ 59,682	\$ 3,465	\$ 7,560	\$ 4,200	\$ 74,907	37,454	18,727	18,727
Task 1*	57	6,565	381	832	462	8,240	4,120	2,060	2,060
Task 2	82	9,549	554	1,210	672	11,985	5,993	2,996	2,996
Task 3	51	5,968	347	756	420	7,491	3,745	1,873	1,873
Task 4	113	13,130	762	1,663	924	16,480	8,240	4,120	4,120
Task 5	108	12,533	728	1,588	882	15,730	7,865	3,933	3,933
Task 6	51	5,968	347	756	420	14,982	7,491	3,746	3,746
*** overhead = per diem costs									
<b>COORDINATION &amp; FUNDING RESEARCH</b>									
	(\$25/hr)	\$ 13,978	\$ 1,823	\$ 608	\$ 3,647	\$ 20,056	10,028	5,014	5,014
Task 1*	62	1,538	201	67	401	2,206	1,103	552	552
Task 2	89	2,236	292	97	584	3,209	1,604	802	802
Task 3	56	1,398	182	61	365	2,006	1,003	501	501
Task 4	123	3,075	401	134	802	4,412	2,206	1,103	1,103
Task 5	117	2,935	383	128	766	4,212	2,106	1,053	1,053
Task 6	56	1,398	182	61	365	2,006	1,003	501	501
Task 7	-	-	-	-	-	-	-	-	-
Task 8	56	1,398	182	61	365	2,006	1,003	501	501
* Tasks are named and described in Scope of Work									
<b>TOTAL</b>						\$ 159,943	\$ 79,972	\$ 39,986	\$ 39,986

\*\*\* overhead = indirect costs, calculated at 15% of salary

Agreement No. \_\_\_\_\_

Exhibit \_\_\_\_\_

**STANDARD CLAUSES— SERVICE & CONSULTANT SERVICE CONTRACTS FOR \$5,000 & OVER WITH NONPUBLIC ENTITIES**

**Workers' Compensation Clause.** Contractor affirms that it is aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self insurance in accordance with the provisions of that Code, and Contractor affirms that it will comply with such provisions before commencing the performance of the work under this contract.

**Claims Dispute Clause.** Any claim that Contractor may have regarding the performance of this agreement including, but not limited to, claims for additional compensation or extension of time, shall be submitted to the Director, Department of Water Resources, within thirty days of its accrual. State and Contractor shall then attempt to negotiate a resolution of such claim and process an amendment to this agreement to implement the terms of any such resolution.

**National Labor Relations Board Clause.** In accordance with Public Contract Code Section 10296, Contractor declares under penalty of perjury that no more than one final, unappealable finding of contempt of court by a federal court has been issued against the Contractor within the immediately preceding two-year period because of Contractor's failure to comply with an order of a federal court which orders Contractor to comply with an order of the National Labor Relations Board.

**Nondiscrimination Clause.** During the performance of this contract, the recipient, contractor and its subcontractors shall not deny the contract's benefits to any person on the basis of religion, color, ethnic group identification, sex, age, physical or mental disability, nor shall they discriminate unlawfully against any employee or applicant for employment because of race, religion, color, national origin, ancestry, physical handicap, mental disability, medical condition, marital status, age (over 40), or sex. Contractor shall insure that the evaluation and treatment of employees and applicants for employment are free of such discrimination. Contractor shall comply with the provisions of the Fair Employment and Housing Act (Government Code Section 12900 et seq.), the regulations promulgated thereunder (California Administrative Code, Title 2, Sections 7285.0 et seq.), the provisions of Article 9.5, Chapter 1, Part 1, Division 3, Title 2 of the Government Code (Government Code Sections 11135 - 11139.5), and the regulations or standards adopted by the awarding State agency to implement such article. Contractor or recipient shall permit access by representatives of the Department of Fair Employment and Housing and the Awarding State agency upon reasonable notice at any time during the normal business hours, but in no case less than 24 hours notice, to such of its books, records, accounts, other sources of information and its facilities as said Department or Agency shall require to ascertain compliance with this clause. Recipient, contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement. The Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

**Statement of Compliance.** The contractor's signature affixed hereon and dated shall constitute a certification under penalty of perjury under the laws of the State of California that the Contractor has, unless exempted, complied with the nondiscrimination program requirements of Government Code Section 12990 and Title 2, California Code of Regulations, Section 8103.

**Performance Evaluation.** Contractor's performance under this contract will be evaluated after completion. The evaluation will be filed with the Department of General Services.

**Availability of Funds.** Work to be performed under this contract is subject to availability of funds through the State's normal budget process.

**Audit Clause.** The contracting parties shall be subject to the examination and audit of the Auditor General for a period of three years after final payment under the contract. (Government Code Section 10532).

**Reimbursement Clause.** If applicable, travel and per diem expenses to be reimbursed under this contract shall be at the same rates the State provides for unrepresented employees in accordance with the provisions of Title 2, Chapter 3, of the California Code of Regulations. Contractor's designated headquarters for the purpose of computing such expenses shall be: 926 J Street;

Suite 612, Sacramento, CA 95814

**Drug-Free Workplace Certification.** By signing this contract, the contractor or grantee hereby certifies under penalty of perjury under the laws of the State of California that the contractor or grantee will comply with the requirements of the Drug-Free Workplace Act of 1990 (Government Code Section 8350 et seq.) and will provide a drug free workplace by taking the following actions:

1. Publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees for violations, as required by Government Code Section 8355(a).
2. Establish a Drug-Free Awareness Program as required by Government Code Section 8355(b), to inform employees of all of the following:
  - (a) The dangers of drug abuse in the workplace,
  - (b) The person's or organization's policy of maintaining a drug-free workplace,
  - (c) Any available counseling, rehabilitation and employee assistance programs, and
  - (d) Penalties that may be imposed upon employees for drug abuse violations.
3. Provide, as required by Government Code Section 8355(c), that every employee who works on the proposed contract or grant:
  - (a) Will receive a copy of the company's drug-free policy statement, and
  - (b) Will agree to abide by the terms of the company's statement as a condition of employment on the contract or grant.

Failure to comply with these requirements may result in suspension of payments under the contract or termination of the contract or both and the contractor or grantee may be ineligible for award of any future contracts if the department determines that any of the following has occurred: (1) the contractor or grantee has made false certification, or (2) violates the certification by failing to carry out the requirements as noted above.

**Priority Hiring Considerations.** For contracts in excess of \$200,000, the contractor shall give priority consideration in filling vacancies in positions funded by the contract to qualified recipients of aid under Welfare and Institutions Code Section 11200. (Public Contract Code Section 10353).

ITEM 6  
NONDISCRIMINATION COMPLIANCE STATEMENT

Exhibit I

CEM 7

COMPANY NAME

PCL Foundation

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

*I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.*

OFFICIAL'S NAME

Gerald H. Meral

DATE EXECUTED

6/30/98

EXECUTED IN THE COUNTY OF

Sacramento, California

PROSPECTIVE CONTRACTOR'S SIGNATURE

PROSPECTIVE CONTRACTOR'S TITLE

Executive Director

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

PCL Foundation

Agreement No. \_\_\_\_\_

Exhibit \_\_\_\_\_

**NONCOLLUSION AFFIDAVIT TO BE EXECUTED BY  
BIDDER AND SUBMITTED WITH BID FOR PUBLIC WORKS**

STATE OF CALIFORNIA )  
 )ss  
COUNTY OF Sacramento )

Gerald H. Meral , being first duly sworn, deposes and  
(name)  
says that he or she is Executive Director of  
(position title)  
PCL Foundation  
(the bidder)

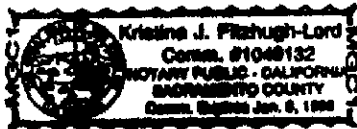
the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

DATED: 6/30/98

By Gerald H. Meral  
(person signing for bidder)

Subscribed and sworn to before me on

June 30, 1998  
Kristina J. Fitzhugh-Lord  
(Notary Public)



(Notarial Seal)